Supplementary Table 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement			
Section/topic	**#**	**Checklist item**	**Reported on page #**
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5-6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	6-7
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6, Suppl Table 2
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	6

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6-7

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	n/a
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7, Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	7-10, Table 1 and 2
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	12, Suppl Table 5
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	n/a
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Table 1 and 2, page 7-12
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	n/a
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	12-3
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	15-16
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	13-16
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	17

Supplementary Table 2 Modified Newcastle-Ottawa Quality Assessment Scale for the assessment diabetes and the post-acute sequelae of COVID-19 (PASC), and incident diabetes in people with vs. without COVID-19

Diabetes and PASC

Criterion	**Score**
Selection	
1. Representativeness of the general population (sampling frame)	
a) National population based; e.g. national insurance or administrative data or national registry	2
b) Non-national population based; e.g. regional, population-based surveys	1
c) Selected group; e.g. patient group; employees; insured population, in a country without universal insurance/ or no description	0
2. Sample size	
a) >10,000	1
b) ≤10,000	0
3. Indication in the paper that outcome of interest (PASC) was not present at start of study (at baseline)	
a) Yes	1
b) No	0
Outcome	
1. Assessment of PASC	
a) Validated/standardized questionnaire (e.g., Functional Impairment Checklist)	4
b) Administrative algorithm where at two or more clinical criteria are used	3
c) Record linkage (Clinical diagnosis) or ICD code	2
d) Self-report	1
e) No description	0
2. Data capture and/adequacy of follow up of cohorts/surveys.	
a) Insurance/electronic databases	2
b) Medical records	2
c) Cohort/survey follow up >80%	2
d) Cohort/survey follow up 60 – 80%	1
e) Cohort/survey follow up <60% or no statement	0
Comparability	
1. Is the incidence rate adjusted/standardized for at least age?	
a) Yes	1
b) No	0
Total score	***11***

Incident diabetes

Criterion	**Score**
Selection	
1. Representativeness of the general population (sampling frame)	
a) National population based; e.g. national insurance or administrative data or national registry	2

b) Non-national population based e.g. regional, population-based surveys	1
c) Selected group; e.g. patient group; employees; insured population, in a country without universal insurance/ or no description	0
2. Sample size	
a) >10,000	1
b) ≤10,000	0
3. Indication in the paper that outcome of interest (diabetes) was not present at start of study (at baseline)	
a) Yes	1
b) No	0
Outcome	
1. Assessment of outcome/diagnosis of diabetes	
a) One or more biomarkers (e.g .Anti-GAD, other antibodies, C-peptide, genetic risk scores) supplemented by clinical criteria	4
b) Administrative algorithm where at two or more clinical criteria are used	3
c) Record linkage (Clinical diagnosis) or ICD code	2
d) Self-report	1
e) No description	0
2. Data capture and/adequacy of follow up of cohorts/surveys.	
a) Insurance/electronic databases	2
b) Medical records	2
c) Cohort/survey follow up >80%	2
d) Cohort/survey follow up 60 – 80%	1
e) Cohort/survey follow up <60% or no statement	0
Comparability	
1. Is the incidence rate adjusted/standardized for at least age?	
a) Yes	1
b) No	0
Total score	***11***

Supplementary Table 3 Formula for estimating relative risk and 95%CI using counts

	PASC/diabetes	*No PASC/no diabetes*
Diabetes/COVID	*A*	*B*
No diabetes/no COVID	*C*	*D*

Relative Risk (RR): [A/(A=B)] / [C/(C+D)]

95%CI: exp(ln(RR)) ± 1.96*SE(ln(RR)), where SE(ln(RR)) =√1/A + 1/C – 1/(A+B) – 1/(C+D)

Source: Kirkwood B and Sterne J (2001). Essentials of Medical Statistics 2nd edition, Blackwell Publishing.

Supplementary Table 4 Individual study definitions of the post-acute sequalae of COVID-19

First author	PASC definition
Alkwai	Persistent symptoms, including headache, fatigue, loss of smell, body aches, fever, loss of taste, throat pain, muscle pain, bone pain, lower back pain, diarrhea, loss of appetite, dry couch, runny nose, sleep disturbance, breathing difficulty, mood changes, nausea, muscle weakness, dizziness, chills, inability to concentrate, chest pain, abdominal pain, swallowing difficulty, red itchy eyes, vomiting
Akter	Mobility complications defined as Confined to bed and Some problems in walking.
	Self-care complications defined as Unable to wash or dress myself and Some problem in washing or dressing.
	Pain/discomfort complications defined as Extreme pain or discomfort and Moderate pain or discomfort.
	Anxiety/depression complications defined as Extremely anxious or depressed and Moderately anxious or depressed.
	Sleep complications defined as Can't sleep, Disturbance in sound sleep and Nightmare.
	Panic attack was assessed as yes or no.
	Loss of concentration was assessed as yes or no.
	Memory loss complications defined as Extreme or Moderate.
	Hairfall was assessed as yes or no.
Basic-Jukic	Persistent symptoms at 8 weeks were fatigue, shortness of breath, cough, joint pain, headache, cognitive problems, intermittent fever, skin rash, hair loss, or other specific problems.
Bellan	Impairments in pulmonary function as assessed by diffusion capacity of the lung for carbon monoxide, and impaired physical functioning as assessed by the Short Physical Performance Battery (SPPB).
Blomberg	Persistent symptoms of fever, cough, dyspnea, palpitations, stomach upset, distributed taste, concentration problems, memory problems, sleep problems, headache, dizziness, tingling in fingers and fatigue as assessed by Chalder fatigue scale. Fatigue is defined as a total bimodal score of 4 or higher on 11 questions.
Budhiraja	Patients were asked regarding presence of any symptoms after discharge from the hospital, as evidence of post-acute sequelae of COVID-19 (PASC) or long COVID. Symptoms asked included loss of taste, loss of smell, low oxygen level, anxiety, memory loss, low mood, mental fogging or lack of concentration, vomiting, gastric issues, insomnia, fatigue, cold, fever, myalgia, cough, dyspnea, chest pain, skin allergy, eyesight, weight loss, hair loss, headache/migraine. Depending upon the number of symptoms and the duration for which each symptom persisted, “symptom-week” was calculated as the sum of duration of all symptoms.
Cervia	During primary infection, five symptoms (fever, fatigue, cough, dyspnea, and gastrointestinal symptoms) were recorded systematically, which were subsequently used for our PACS prediction model. All five symptoms were patient reported symptoms and, based on a standardized questionnaire, individually asked by a trained physician whether they were present during primary infection. Patient reported temperature can be inaccurate for various reasons, including individual body temperature norms that vary with patient age as well as method and timepoint of measurement. Therefore, the following was considered as patient-reported “fever”: (i) reported increase of body temperature, (ii) fever chills, or (iii) sweating. Gastrointestinal symptoms were counted as one symptom, also when multiple gastrointestinal symptoms were reported, including nausea, loss of appetite, heartburn, abdominal pain, flatulence, diarrhea, and obstipation. A total of nine symptoms were recorded systematically at follow-up visits (fever, cough, dyspnea, fatigue, gastrointestinal symptoms, headache, chest pain, anxiety and/or depression, and disorders of smell and/or taste). Additional patient-reported prolonged symptoms were also recorded. Symptom severity was not assessed.
Chai	Patients asked about fatigue, shortness of breath, chest tightness, and cough every 3 months until follow-up end or death.
Crankson	Long COVID was operationalized as patients who still reported symptoms of COVID-19 4 weeks after the initial illness with no alternative medical diagnosis. It was examined as a binary outcome with those without long COVID coded as “0” and those with long COVID as “1”.
Fernández-de-Las-Peñas	Participants were systematically asked about dyspnea, fatigue, chest pain, headache, anosmia, ageusia, cough, palpitations, diarrhea, cognitive blunting/brain fog, pain, or memory loss. Anxiety and depression, sleep quality, and activities of daily living were measured. The Hospital Anxiety and Depression Scale (HADS) and the Pittsburgh Sleep Quality Index (PSQI) were used to assess anxiety/depression symptoms and sleep quality, respectively. The following items were taken from the Functional Impairment Checklist (FIC): dyspnea at rest, dyspnea on exertion, generalized fatigue, limitations occupational activities, limitations social/leisure activities, limitations in basic activities of daily living, and limitations in instrumental activities of daily living.
Ioannou	Documentation in electronic health records of any of the following 4 COVID-19–related ICD-10 codes in 1 or more VA encounters 3 or more months after the date of infection extending to December 31,

	2021, henceforth referred to as having documented long-COVID care: U07.1 (“COVID-19”), Z86.16 (“Personal history of COVID-19”), U09.9 (“Post COVID-19 condition, unspecified”), and J12.82 (“Pneumonia due to coronavirus disease 2019”)
Jones	Long COVID is based on COVID-19 status and symptom duration based on symptom start and end date as reported by the patients. Patients were considered to have had long COVID if they were self-diagnosed, clinician-diagnosed, or test-confirmed for COVID-19 and have symptoms of COVID which lasted for more than 4 weeks based on the NICE guideline definition for long COVID.
Loosen	Long COVID syndrome was identified based on the original diagnosis text of the physicians (“long COVID syndrome”, “post COVID syndrome, “post COVID complications”) and ICD-10 diagnoses. The following ICD-10 diagnoses were additionally used as surrogates for long COVID syndrome: chronic fatigue (ICD-10: G93.3), abnormalities of breathing (ICD-10: R06), disturbances of smell and taste (ICD-10: R43), malaise and fatigue (ICD-10: R53, disturbances in attention (ICD-10: R41.8).
Mechi	Patients were interviewed by a trained physician in the outpatient clinic and asked to report symptoms from a pre-defined list of symptoms, including shortness of breath interfere with routine daily activities; easy fatigue; cough; chest pain; palpitation; joint pain; and neurocognitive dysfunction which includes dizziness, headache, concentration abnormalities, memory disturbances, smell loss, and taste loss. If there was a symptom that was not mentioned in the symptom questionnaire list, patients were asked to describe it.
Messin	presence of persistent symptoms at 6 months (±2 months) of SARS-CoV-2 infection (dyspnea, asthenia, agueusia, anosmia, anxiety, other). Asthenia was measured according to the WHO performance status. Anxiety was measured using an ordinal scale (not anxious, slightly anxious, moderately anxious, highly anxious, very highly anxious). The intensity of dyspnea was measured using the mMRC (modified Medical Research Council) scale proposed by the French pneumology society. The degree of lung damage was estimated on chest CT scan, if applicable, according to the classification that was proposed by the French society of radiology for patients with suspected COVID-19 infection in March 2020. Patients with persistent dyspnea were seen in consultation to perform a clinical examination, oxygen saturation, blood gas, a 6-min walking test (6WT), lung functions tests (LFT) and low-dose chest CT scan.
Nesan	General symptoms: muscular weakness, myalgia, tiredness and fatigue
	Cardio-respiratory symptoms: palpitations, chest pain, breathing difficulty
	Abdominal symptoms: nausea/vomiting, loss of appetite, abdominal discomfort, constipation
	Psychological symptoms: mood changes, sleep disturbances, stress, anxiety
	Neurological symptoms: burning and prickling sensation of body, loss of smell, loss of taste, headache, confusion, numbness
	Renal symptoms: reduced urine output
Nguyen	Reported smell and/or taste disorders during the initial acute phase of COVID-19 reported and persistence of these symptoms 6 months after onset.
Pfaff	Electronic medical records as well as data from 597 patients from a long COVID clinic used to train three machine learning models to identify potential long COVID among all patients with COVID-19, patients hospitalized with COVID-19, and patients who had COVID-19 but were not hospitalized and was further validated the models on data from a fourth site.
Peghin	Patients were telephone interviewed by trained nurses with a pilot tested questionnaire investigating specific persistent or emerging symptoms potentially associated with COVID-19. Participants were free to answer in their own words according to the patient-reported outcomes (PROs) framework [9]; the interview took from 10 to 30 minutes. Their narratives were categorized by four independent physicians: post-COVID-19 syndrome was defined as symptoms that developed during or after COVID-19, continued for 12 weeks, and were not explained by an alternative diagnosis.
Profili	First hospitalization for myocardial infarction (ICD-9 410.xx or ICD-9: 36.01, 36.02, 36.05, 36.06, 36.1), or stroke (ICD9 430.xx, 431.xx, 432.xx, 434.xx or 436.xx).
Rinaldi	All patients received a clinical follow-up by telephonic interview and/or clinical visit every 3 months from hospital discharge, for up to 18 months or up to the first occurrence of a major adverse CV and cerebrovascular event (MACE). MACE was defined as the composite of CV death, admission for ischemic heart disease (IHD) (including both acute coronary syndrome and chronic coronary syndrome), stroke/transient ischemic attack (TIA), and hospitalization for heart failure (HF). In addition, we also recorded the incidence of arrhythmias, inflammatory heart disease, and thrombotic disorders at follow-up. Arrhythmias were defined as the composite of new onset atrial fibrillation (AF) and/or ventricular tachycardia (sustained or non-sustained). Inflammatory heart diseases were defined as the composite of pericarditis and/or myocarditis. Thrombotic disorders were defined as the composite of pulmonary embolism, deep vein thrombosis and/or superficial vein thrombosis

Su	PASC symptoms include: respiratory viral (at least 2 of cough, fatigue, shortness of breath, fever or chills, muscle/body aches, nausea), gastrointestinal (diarrhea, abdominal pain), neurologic (anxiety, blurred vision, depression, memory problems, difficulty concentrating, difficulty sleeping, dizziness, headache), and anosmia/dysgeusia (loss of taste, loss of smell).
Sudre	Long COVID was defined as symptoms that persisted for more than 4 weeks (28 d, LC28), more than 8 weeks (56 d, LC56) or more than 12 weeks (LC84) between symptom onset and end.
Yaksi	The presence of one or more symptoms that persist for four weeks to one year after COVID-19: fatigue/weakness, respiratory distress, muscle-joint pain, memory loss, cough, hair loss, insomnia, loss of taste/smell, headache, chest pain, attention deficit, nausea/vomiting, heart palpitation, fever, diarrhea, flu-like symptoms.
Yoo	Patients were characterized as having PASC if they noted persistent COVID-19 symptoms on the 90-day post-discharge survey (or the 60-day survey if the 90-day survey was incomplete). Persistent symptoms are fatigue, loss of taste or smell, shortness of breath, muscle aches, chest pain, nausea, vomiting, or diarrhea, fever, chills, night sweats, rashes.

Supplementary Table 5 Newcastle-Ottowa quality assessment of included studies

	Selection (max 4)			**Outcome (max 6)**		**Comparability (max 1)**	
First author	Representativeness (/2)	Sample size (/1)	Not present at start (/1)	Assessment of outcome (/4)	Data capture and/adequacy of follow up (/2)	Adjustment/ standardization (/1)	**Final score (/11)**
Diabetes and PASC							
Alkwai	0	0	0	1	0	0	**1**
Akter	1	0	0	1	2	0	**4**
Basic-Jukic	0	0	1	4	2	1	**8**
Bellan	1	0	1	1	2	0	**5**
Blomberg	1	0	1	2	2	1	**7**
Budhiraja	1	0	1	2	2	0	**6**
Cervia	1	0	1	4	1	0	**7**
Chai	1	0	1	1	2	0	**5**
Crankson	1	0	1	1	2	0	**5**
Fernández-de-Las-Peñas	1	0	1	4	1	1	**8**
Ioannou	1	1	1	3	2	1	**9**
Jones	2	1	1	4	2	1	**11**
Loosen	1	1	1	3	2	1	**9**
Mechi	0	0	1	2	1	0	**4**
Messin	0	0	1	2	0	0	**3**
Nesan	1	0	1	4	2	1	**9**
Nguyen	1	0	1	4	2	0	**8**
Peghin	0	0	1	2	2	0	**5**
Pfaff	2	1	1	3	2	0	**9**
Profili	1	1	1	2	2	1	**8**
Rinaldi	0	0	1	3	2	1	**7**
Su	1	0	1	4	2	1	**9**
Sudre	2	0	1	1	2	1	**7**
Yaksi	1	0	0	4	2	0	**7**
Yoo	1	1	1	4	2	1	**10**
New-Onset Diabetes							
Al-Aly	1	1	1	2	2	1	**8**
Ayoubkhani	2	1	1	2	2	1	**9**
Barrett	1	1	1	2	2	1	**8**
Daugherty	2	1	1	2	2	1	**9**
Hernandez-Romieu	1	1	1	2	2	0	**7**

Horberg	2	1	1	2	2	1	**9**
Kendall	2	1	1	2	2	1	**9**
McKeigue	2	1	1	3	2	1	**10**
Nayar	0	1	1	0	2	1	**5**
Rezel-Potts	2	1	1	3	2	1	**10**
Wander	1	1	1	3	2	1	**9**
Xie(1)	1	1	1	3	2	1	**9**
Xie(2)	1	1	1	3	2	0	**8**
Zhang	2	1	1	2	2	1	**9**